Colorado Potato Beetles Love Freeze-Dried Diet

You say "po-tay-to." I say "po-tah-to." Colorado potato beetles say "yum-yum."

Descriptions of garden pests usually don't include the word finicky, but Colorado potato beetles like to limit their munching to plant leaves, particularly potato leaves. But for researchers, this poses a problem. How do you keep the little critters alive long enough to learn how to kill them? Potato leaves aren't a year-round delicacy in most parts of the United States.

"One difficulty in developing new means to control this pest has been the lack of an artificial food that the beetle will eat and is available year-round, unlike potato plants," says ARS microbiologist Phyllis A. Martin.

Now, Martin and her colleagues at the Insect Biocontrol Laboratory, in Beltsville, Maryland, have developed a freeze-dried diet palatable to the beetle. Earlier, the lab had formulated a diet the picky pest would eat—but only if it was freshly prepared right before feeding.

Freeze-drying, commonly used to make instant coffee and packaged food for astronauts and backpackers, preserves the diet after preparation. "The beetles readily eat a freeze-dried diet that has been rehydrated," says Martin. "This is really convenient and time-conserving because it allows for long-term storage of prepared food. Like other freeze-dried foods, this diet has an extended shelf-life, currently estimated to be at least 9 months."

A freeze-dried diet has other benefits, too. It provides a way to administer certain bacteria or fungi being considered for beetle control. Previously, to test these toxins, fresh potato leaves were required. But this slowed down the study.

"Research must be done in repetitions to gain enough data for statistical analysis," explains Martin. "We needed to use five insects per leaf to equal one repetition. But with the freeze-dried diet, using five insects equals five repetitions," thus five times more data.

In tests, researchers found that bacteria that killed beetles on leaves did not kill as many of them on the earlier, fresh, diet. But when fed the freeze-dried diet containing toxic bacteria, more insects died—and faster—than those fed the same bacteria mixed in fresh diet. According to Martin, the reason for this is that the bacteria must be added to fresh diet while it's in its liquid—and hot—state. But the heat kills the bacteria, which reduces toxicity. Bacteria added to the diet once it's cooled and solidified doesn't get evenly incorporated into the food, and the bugs will not get a lethal dose.

The new and convenient freeze-dried diet provides a way to test a wider range of bacterial and fungal controls for the Colorado potato beetle because the toxins can be safely added as the diet is rehydrated.

Finding ways to control Colorado potato beetles is vitally important to commercial growers. Both immature and adult beetles feed on leaves of eggplant and tomato as well as potato and have developed resistance to most available insecticides.—By **Sharon Durham,** ARS.

This research is part of Crop Protection and Quarantine, an ARS National Program (#304) described on the World Wide Web at www.nps.ars.usda.gov.

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PEGGY GREB (K11087-1)

Technician Teddi Shropshire, shown handling a freeze-dried diet, prepares to test bacteria for their ability to control Colorado potato beetle larvae.

PEGGY GREB (K11094-1)

A Colorado potato beetle larva on its favorite food, a potato leaf.

PEGGY GREB (K11100-1)

An adult Colorado potato beetle devouring a potato leaf.